FOREST PRODUCTS RESEARCH IN PICTURES

NO. 28

DRAWING SHOWS STRUCTURE OF SOFTWOOD

FOREST PRODUCTS LABORATORY
U. S. FOREST SERVICE
MADISON, WISCONSIN

This drawing of the cell structure of a minute block of softwood – white pine – was made by a wood technologist at the Forest Products Laboratory. The microscope cannot bring several planes into sharp focus at the same time as does this drawing, but it was by means of studies of various thin sections with the microscope that the drawing was accomplished. The drawing here shows a cube less than ¼ inch on a side.

Wood, instead of being a relatively solid material like steel or concrete, is seen to be composed of many tubular fiber units or cells cemented together and having on their walls thin areas to permit the passage of the sap.

The top of the block represents a plane parallel to the top surface of a stump or the end surface of a log. The rectangular units which make up this surface are sections through vertical cells, mostly tracheids or water carriers, TR, the walls of which form the bulk of the wood substance. Between the various cell units is a cementing substance called the middle lamella, ML. Springwood cells S, distinguishable by their greater size, and summerwood cells SM are formed during the early part and the later part of a year's growing period, respectively. The growth of the springwood is the more rapid. Together the springwood and the summerwood cells make up the annual ring AR. One such ring is added to the outside of the tree each year.

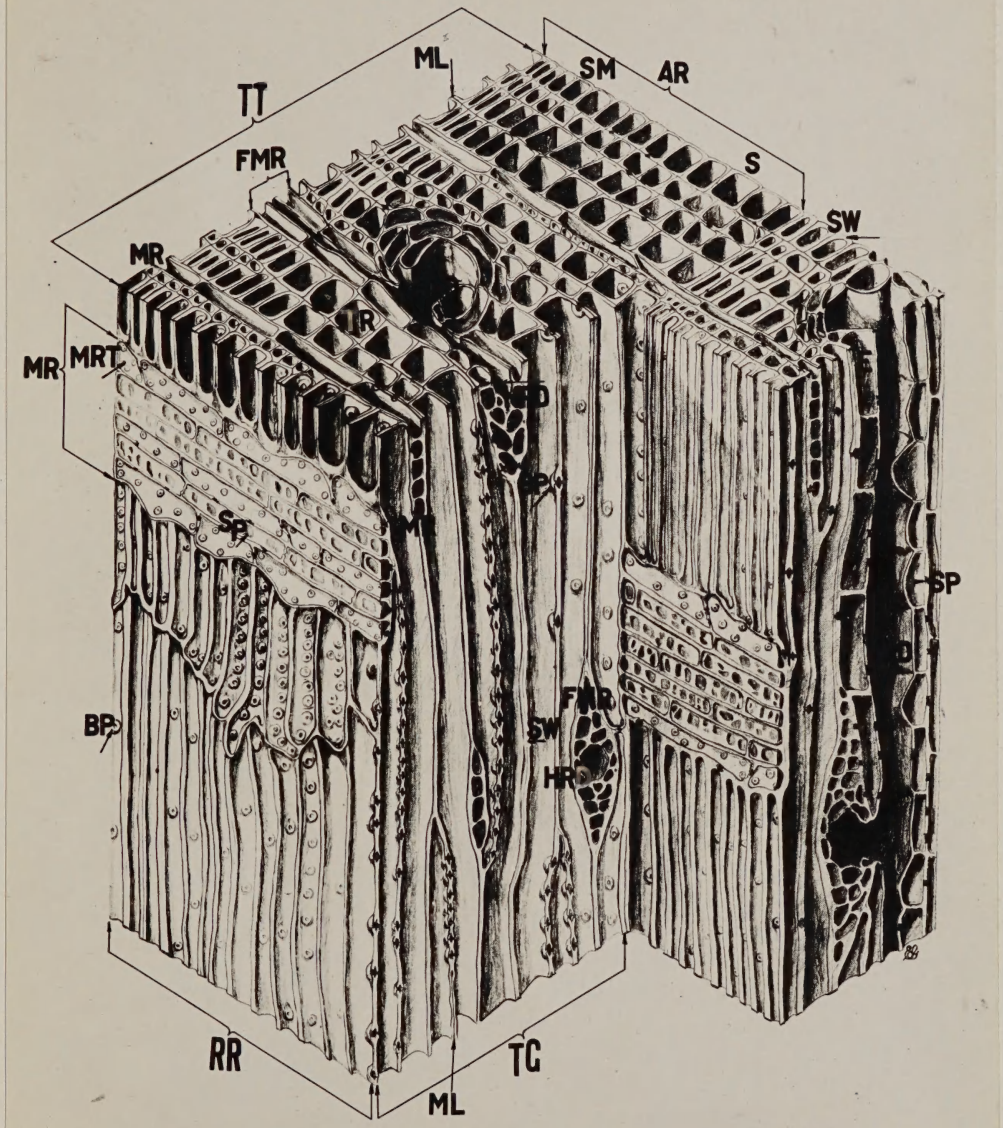
The function of the medullary rays MR is to store and to distribute horizontally the food material of the tree. These rays – including the fusiform medullary rays FMR, or rays having horizontal resin ducts HRD, at their centers – are found on the end of a stick as fine white lines radiating from the center. The large hole in the center of the top surface is a vertical resin duct.

The left side surface RR represents a vertical plane along the radius of the trunk. This surface – commonly called "edge grain" in softwoods and "quarter-sawed" in hardwoods – is not so distinctively marked in the softwoods as in the hardwoods. In some hardwoods, the "quartered" surface with its large lustrous "flakes" formed by medullary rays entering and leaving the plane of the saw is valued for use in furniture because of its attractive figure.

The symbol SP indicates a simple pit, an unthickened portion of the cell wall through which sap passes from ray cells to fibers or vice versa. The bordered pits BP, seen in section on surface TG, have their margins overhung by the surrounding cell walls.

The surface TG, at right angles to the radial or quarter-sawed surface, corresponds to the flat grain or plain-sawed surface of lumber.

(Photograph by Forest Products Laboratory, U. S. Forest Service)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